

Arctic

Examples of Health Impacts

Anthropogenic pollutants

The long-range transport of environmental contaminants to the Arctic from both external and local industrialized sources plus their accumulation in animals and plants pose a health hazard to Arctic residents and, especially, indigenous peoples.

Natural pollutants

Transport by wind of natural atmospheric contaminants

- Long-term exposure to windborne dust and volcanic ash - life-shortening respiratory problems such as asthma and silicosis.
- Smoke from large boreal wildfires - skin and eye irritation, asthma, bronchitis, and possible factor in lung cancers.
- Pathogens – (microbes, spores) distributed across biomes and continents, either attached to windborne particulate material or as free floaters.

Additional Factors = Climate Change + Increased UV-B Radiation (from Ozone Depletion)

Contaminants include:

- Persistent organic pollutants (POPs)
- Radionuclides
- Heavy metals
- Pesticides
- Polychlorinated biphenyls (PCBs)
- Acidification
- Arctic haze
- Oil pollution.
- Smoke, dust, and ash

Bioaccumulation and biomagnification up the food chain = a major factor

Contaminant Transport Mechanisms

a) Atmospheric:

1. Strong South to North Air Flows.

Especially over West Eurasia in winter:

- . e.g.: Sulfur and Nitrogen compounds, POPs, and radionuclides from lower latitudes

2. Strong Westerlies

Dust, volcanic ash, and airborne contaminants (including microbes) transported from eastern Asia to western North America

b) Arctic Rivers: Strong South to North water flows into the Arctic

- e.g.: Contaminated suspended solids and sediments, including PCBs, DDT(spell out), radionuclides, heavy metals, oil
- Sedimented into estuaries, deltas, and Arctic coastal shelves
- Deposited in ocean from terrestrial systems via river runoff

c) Ocean Waters: Major storage reservoir and transport medium

- e.g.: POPs (storage & transport) and other contaminants
- Long-distance transport of previous releases of radionuclides from mid latitudes.
- Transport of contaminants (radionuclides) dumped at sea

d) Sea Ice: Transport of contaminants on or in the ice

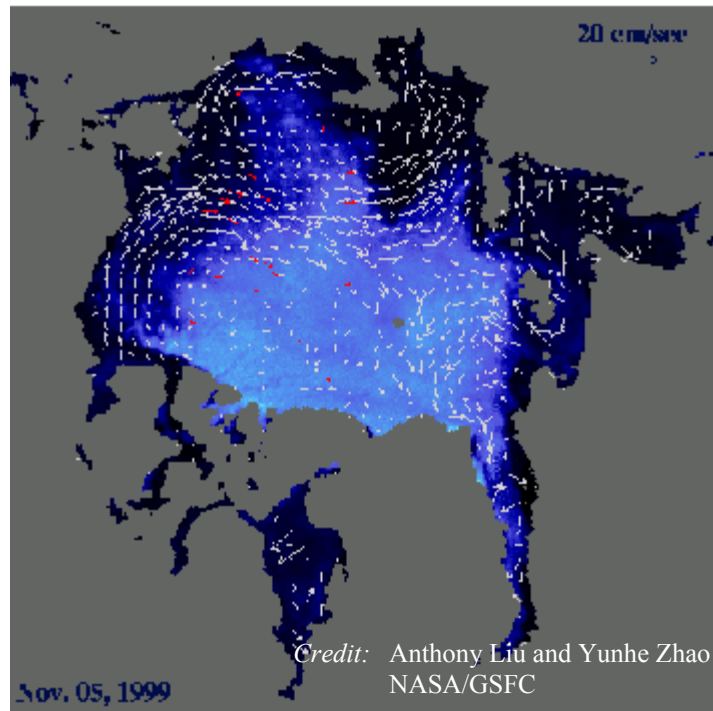
- e.g., POPs, heavy metals
- Sea ice contaminated through deposition from the atmosphere or coastal sediments
- Redistribution during ice melt



SEAWiFS image of the White Sea. The outflow of the Dvina River is quite brown with suspended sediments.

Satellite Sensors

- **Atmospheric**: TOMS, MOPITT, MODIS, AVHRR
- **Arctic Rivers**: Polar VIS/IR Data from SeaWiFS, AVHRR, MODIS
- Polar microwave data from Radarsat and Synthetic aperture Radar (SAR)
- **Ocean Waters**: AVHRR, MODIS, SeaWiFS
- **Sea Ice**: sea ice extent, concentration, motion, velocity
 - Global Passive Microwave Data: SMMR, SSM/I, & future AMSR
 - Synthetic Aperture Radar: Radarsat, ERS-1, ERS-2
 - Polar VIS/IR: MODIS, AVHRR, SeaWiFS



Arctic Sea Ice Drift from QuikSCAT Data